Pearson Edexcel

Additional Assessment Materials Summer 2021

Pearson Edexcel GCSE in Chemistry (1CH0) Higher

Resource Set Topic D: States of matter and mixtures

Questions

(Public release version)

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Additional Assessment Materials, Summer 2021

General guidance to Additional Assessment Materials for use in 2021

Context

- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose

- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

5 (a) Which of the following substances will be a solid at 20 °C and will melt when placed in a beaker of hot water at 80 °C?

(1)

	melting point in °C	boiling point in °C
☒ **A**	122	249
☒ **B**	−7	59
☒ **C**	30	2403
☒ **D**	−32	27

(b) A student set up the apparatus shown in Figure 4 to obtain pure water from sea water by distillation.

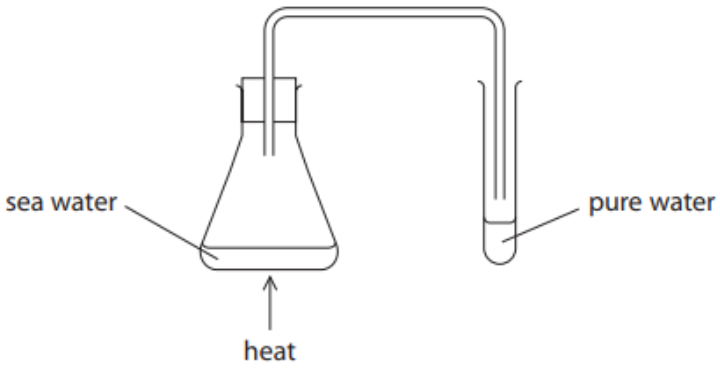


Figure 4

(i) Explain how the water in sea water separates to produce the pure water in this apparatus.

(2)

When seawater is heated, water evaporates and travel through the tube as water vapour. The water vapour then condense into liquid and is collected in the test tube.

(ii) Explain how the apparatus could be improved to increase the amount of pure water collected from the same volume of sea water.

(2)

Seal the test tube to avoid water vapour escaping.

(c) A substance is heated at a constant rate and its temperature is taken every minute. During the heating, the substance undergoes one change of state.

The results are shown on the graph in Figure 5.

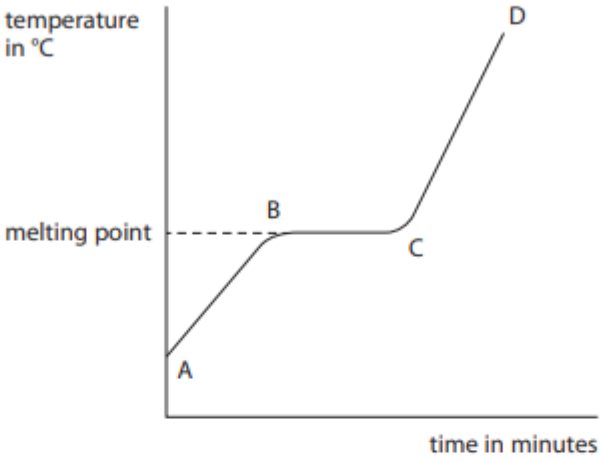


Figure 5

Explain the shape of the graph in terms of the changes in the movement and arrangement of the particles as the substance is heated.

(4)

At A, the substance is a solid. As temperature increases, particles gain more energy and vibrate more. At B, energy is taken in as the substance is melting, so temperature does not increase. At C, the substance is in a liquid state and particles move around while touching each other. At D, particles gain more energy and move further apart.

5

(c) In a different method of obtaining nickel, the process produces a mixture of the liquids nickel tetracarbonyl and iron pentacarbonyl.

The boiling point of nickel tetracarbonyl is 43 °C.
The boiling point of iron pentacarbonyl is 103 °C.
These two liquids mix together completely.

Describe the process used to separate these two liquids.

(3)

The two liquids can be separated by simple distillation as there is a big difference in their boiling points. When the mixture is heated to 43°C, nickel tetracarbonyl will evaporate and will be condensed into a tube. Iron pentacarbonyl will remain in the flask.

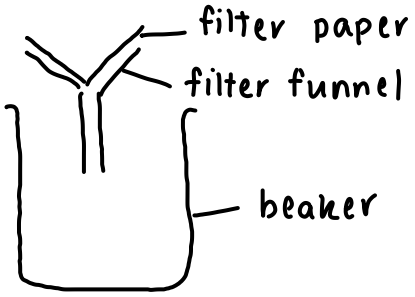
5 (a) A sample of rock salt contains a mixture of sodium chloride and some insoluble substances.

The rock salt is added to water and the mixture stirred.

The mixture is then filtered to obtain a filtrate of sodium chloride solution.

(i) Draw a labelled diagram of the apparatus used to filter the mixture and collect the sodium chloride solution.

(2)



(ii) Describe how a sample of pure, dry sodium chloride crystals can be obtained from the filtrate.

(3)

The sodium chloride solution is heated in a crucible until the crystallisation point. The crystals are then washed with distilled water and dried within filter paper.

(b) Inks contain coloured dyes.
Samples of four inks, **W**, **X**, **Y** and **Z**, were separated using paper chromatography.
Figure 5 shows the chromatogram obtained.

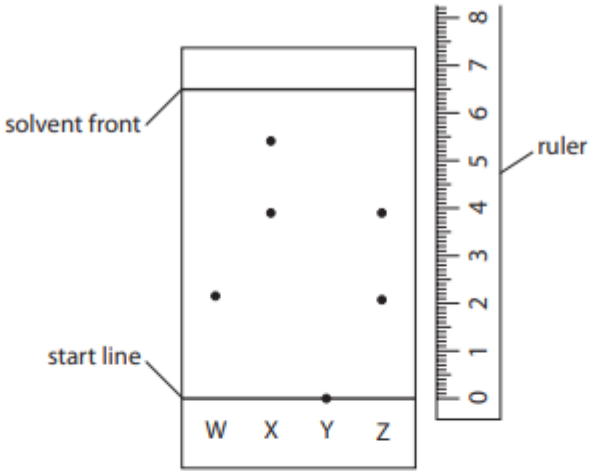


Figure 5

(i) In the experiment, the solvent front moved 6.5 cm.
Calculate the R_f value of the dye that is present in both inks **X** and **Z**.

(1)

$\frac{4}{6.5} = 0.615$

$R_f =$ 0.615

(ii) State what could be changed in the experiment to make the R_f value more accurate.

(1)

let the solvent travel further up the filter paper

(iii) In this experiment, ink sample **Y** did not move from the start line.
Explain a change to the experiment that would be needed to separate the dyes in ink sample **Y**.

(2)

The dyes in ink Y might not be soluble in the solvent.
A different solvent can be used.

TOTAL FOR PAPER IS 21 MARKS